REMARKS

Please consider the following comments. Following this response, claims 1-20 are pending. The applicant respectfully requests reconsideration and allowance of this application in view of the above amendments and the following remarks.

Priority

The applicant notes with appreciation the acknowledgement of the claim for priority under section 119 and the notice that all of the certified copies of the priority documents have been received.

Information Disclosure Statement

The applicant acknowledges and appreciates receiving an initialed copy of the form PTO-1449 that was filed on June 8, 2004.

Claim Rejections – 35 U.S.C. § 112

The Examiner has rejected claim 16 under 35 U.S.C. § 112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner has noted that the term "the threshold" in line 4 does not have sufficient antecedent basis.

By this response, Applicants have amended claim 15 to recite "an acceleration threshold." This provides proper antecedent basis to the term in claim 16, which depends from claim 15. Applicants therefore respectfully submit that claim 16 is fully definite and meets all the requirements of 35 U.S.C. § 112.

For at least these reasons, Applicants respectfully request that the Examiner withdraw the rejection of claim 16 under 35 U.S.C. § 112, second paragraph, for allegedly failing to

particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim Rejections – 35 U.S.C. § 102

The Examiner has rejected claims 10-16 and 18-20 under 35 U.S.C. § 102(b) as being allegedly anticipated by United States Published Patent Application No. 2002/0099486 to Nagao et al. ("Nagao"). Applicants respectfully traverse this rejection.

Claim 10, as amended, recites "an acceleration detector periodically detecting a lateral acceleration of the vehicle detectable in a lateral direction of the vehicle," and "a side-impact determination unit performing a first side-impact determination using a value of the detected lateral acceleration to determine whether or not there is a side impact on the vehicle, and a second side-impact determination using the value of the detected lateral acceleration to determine on which lateral side of the vehicle the side impact occurs."

The Examiner appears to assert that the lateral acceleration sensor 22 in Nagao (which performs step 505 in FIG. 6) discloses the recited acceleration detector, and that the right side-crash sensor 23 and the left side-crash sensor 24 disclose the recited side-impact determination unit. However, a careful examination of relevant portions of Nagao will show that this is not the case.

The lateral acceleration sensor 22 in Nagao is arranged to detect an acceleration GY of the vehicle 10 (vehicle body) in its lateral or transverse direction. A positive value of the acceleration GY indicates the acceleration in the right direction; and presumably a negative value of GY indicates acceleration in the right direction. (See e.g., Nagao, paragraph 40, and FIG. 5.) During each cycle of the routine discloses in Nagao, the CPU 20a performs step 505 to read the lateral acceleration value GY represented by the output signal of the lateral acceleration sensor 22, and step 510 to read the roll rate RR represented by the output signal of the roll rate sensor

21. The CPU 20a then makes a first determination as to whether the vehicle 10 has a rollover motion in step 520 based on the roll rate RR and the roll angle RA. (See e.g., Nagao, paragraphs 43 and 44, and FIG. 6.)

If step 520 in Nagao determines that there is no rollover, then the CPU 20a proceeds to step 530 to make a second determination as to whether the vehicle 10 has a rollover motion. This second determination is made based on the actual values of the roll rate RR and lateral acceleration value GY obtained in steps 510 and 505. (See e.g., Nagao, paragraph 45, and FIG. 6.) But the value GY is never used to determine on which lateral side of the vehicle the side impact occurs.

The right side-crash sensor 23 detects a lateral acceleration value of a right-side center pillar, and compares the detected lateral acceleration value with a predetermined threshold to generate an output signal RS that has a logical value "1" (a high level) when the detected lateral acceleration value is larger than the threshold, and a logical value "0" (a low level) when the detected lateral acceleration value is not larger than the threshold. The output signal RS having the logical value "1" (high level) indicates that a crash of the vehicle 10 has taken place on its right side. (See e.g., Nagao, paragraph 41, and FIG. 5.)

Likewise, the left side-crash sensor 24 detects a lateral acceleration value of a left-side center pillar and compares the detected lateral acceleration value with a predetermined threshold to generate an output signal LS which has a logical value "1" when the detected lateral acceleration value is larger than the threshold, and a logical value "0" when the detected lateral acceleration value is not larger than the threshold. The output signal LS having the logical value "1" indicates that a crash of the vehicle 10 has taken place on its left side. (See e.g., Nagao, paragraph 42, and FIG. 5.)

But the lateral acceleration values detected by the crash sensors 23 and 24 are never used to determine whether or not there is a side impact on the vehicle. For that determination, the CPU 20a uses the lateral acceleration value GY output by the lateral acceleration sensor 22.

The reason for this process in Nagao is that Nagao supplies a system in which only a curtain bag on an impacted side of a vehicle is inflated and deployed when a side impact (i.e., crash) occurs, while curtain bags on both sides of a vehicle are inflated and deployed when a rollover occurs. In such a system, when a side impact is detected, a separate rollover determination must also be made to determine whether curtain bags on a non-collision side should be deployed. Unless this rollover determination indicates a rollover, the disclosed system only deploys a curtain bag on a side where a collision was detected.

In contrast, claim 10 requires that the side-impact determination unit performing two separate side-impact determinations. It performs a first side-impact determination using a value of the detected lateral acceleration to determine whether or not there is a side impact on the vehicle. It then performs a second side-impact determination using the value of the detected lateral acceleration to determine on which lateral side of the vehicle the side impact occurs. This can be seen by way of example in Applicants' specification from page 22, line 36, through page 24, line 20, and FIGs. 11 and 12, which describes the fourth embodiment.

By using this process, the system of claim 10 makes its determination as to whether or not a vehicle is about to roll over based on a combination of a side impact determination using a lateral acceleration and a rollover determination mainly using a roll angular velocity (i.e., roll rate). In this way, a trip-over, for which lateral acceleration is normally larger, can be quickly detected through the side impact determination, while a rollover whose lateral acceleration is smaller is subjected to the general rollover determination. As a result, a trip-over can be more quickly and steadily distinguished from other rollovers.

Nothing in Nagao discloses or suggests a side-impact determination unit that performs these two determinations based on the output from the same acceleration detector. Thus, Nagao fails to disclose every feature recited in claim 1.

Claims 11-16 and 18-20 depend variously from claim 10 and are allowable for at least the reasons given above for claim 10.

For at least the reasons given above, Applicants respectfully request that the Examiner withdraw the rejection of claims 10-16 and 18-20 under 35 U.S.C. § 102(b) as being allegedly anticipated by United States Published Patent Application No. 2002/0099486 to Nagao.

Claim Rejections – 35 U.S.C. § 103

The Examiner has rejected claims 1-9 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Nagao in view of United States Patent No. 6,038,495 to Schiffmann ("Schiffmann"). Applicants respectfully traverse this rejection.

Claim 1 recites "a memory unit memorizing values of the roll angular velocity periodically detected by the roll angular velocity detector," "a predictive angular velocity calculator calculating a predictive value of the roll angular velocity to be expected after an elapse of a predetermined period of time on the basis of the values of the roll angular velocity including a past value of the roll angular velocity memorized in the memory unit," and "a rollover determination unit determining whether or not there is a possibility that the vehicle will make a rollover, on the basis of the predictive value of the roll angular velocity."

The Examiner has asserted that Schiffmann discloses the recited memory unit in column 5, lines 1-5. However Applicants cannot see how this or any other portion of Schiffmann discloses or suggests a memory unit that memorizes values of a roll angular velocity. This portion of Schiffmann simply notes that the disclosed algorithm 80 for predicting a rollover

condition of a vehicle can be implemented in analog circuitry as well as digital processing. It also notes that while a vehicle rollover condition about the vehicle's longitudinal axis is predicted by rollover prediction algorithm 80, this algorithm 80 can likewise be used to predict a vehicle pitchover about the lateral axis of the vehicle by sensing pitch angular rate in place of the roll angular rate. (See, e.g., Schiffmann, column 5, lines 5-10.) But this says nothing with respect to a memory unit.

Schiffmann discloses a scheme in which a roll angular velocity RR (or roll rate) and a current roll angle RA (which is obtained by integrating the roll angular velocity), are used to predict a roll angle RA to be expected after a predetermine time (i.e., a future roll angle) and the predicted roll angle is used to predict a rollover motion. In particular, Schiffmann discloses a Taylor series predictor 104 that generates a predicted roll angle φ_T as a function of an estimated roll acceleration $\hat{\ddot{\phi}}$, the bias-corrected roll rate, and the estimated current roll angle $\hat{\phi}$. (See, e.g., Schiffmann, column 8, line 28-40, and FIG. 2)

In contrast, the claim 1 directly uses values of the roll angular velocities (i.e., roll rates) for determining a rollover motion, including past values of the roll angular velocity. This makes it possible that a rollover motion is determined more quickly, leading to activating occupant protective devices in a steady fashion with no excessive delay (See, e.g., Applicants' specification, page 13, lines 2-12).

And although the Taylor series predictor 104 allows the vehicle rollover prediction algorithm 80 to predict a roll angle an advance time T into the future, it does not do so on the basis of the values of the roll angular velocity including a past value of the roll angular velocity memorized in a memory unit, as required by claim 1.

Therefore, Schiffmann fails to teach or suggest the prediction carried out based on roll angular velocities (i.e., past and current roll angular velocities). Hence, even combining Schiffmann with Naqao et al, it is difficult for the person skilled in the art to easily conceive the scheme of using only roll angular velocities in determining rollover motions of a vehicle.

Claims 2-9 depend variously from claim 1 and are allowable for at least the reasons given above for claim 1.

For at least the reasons given above, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-9 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Nagao in view Schiffmann.

Claim Amendments

By this response, the applicant has amended claim 1-11 and 13-20 to better recite the claimed invention. These amendments are being made solely to clarify what is recited by the claims, and not in response to an art rejection. Any narrowing amendment to the claims in the present amendment is not to be construed as a surrender of any subject matter between the original claims and the present claims; rather this is merely an attempt at providing one or more definitions of what the applicant believes to be suitable patent protection. The present claims provide the intended scope of protection that the applicant is seeking for this application. Therefore, no estoppel should be presumed, and the applicant's claims are intended to include a scope of protection under the Doctrine of Equivalents.

Allowable Subject Matter

The Examiner objected to claim 17 as being dependent upon a rejected base claim, but has indicated that they would be allowable if rewritten into independent form including all of the limitations of the base claim and any intervening claims.

Applicants respectfully acknowledge the allowability of claim 17. However, since for the reasons above, claim 15, from which claim 17 depends, is also allowable, Applicants wish to retain claim 17 in dependent form.

Conclusion

For all the reasons advanced above, the applicant respectfully submits that pending claims 1-20, as amended are allowable.

In view of the foregoing, the applicant respectfully submits that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

Please charge any unforeseen fees that may be due to Deposit Account No. 50-1147.

Respectfully submitted,

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